



Inter**Lab**<sup>®</sup>

## FCC Measurement/Technical Report on

GSM/UMTS PCMCIA Card  
GlobeTrotter Express HSUPA E  
GE0301

**Report Reference:** MDE\_Opti\_0702\_FCCr

**Test Laboratory:**

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DAT-P-192/99-01



**Note:**

The following test results relate only to the devices specified in this document. This report shall not be reproduced in parts without the written approval of the testing laboratory.

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## **0 Summary**

### **0.1 Technical Report Summary**

#### **Type of Authorization**

Certification for a GSM cellular radiotelephone device

#### **Applicable FCC Rules**

Prepared in accordance with the requirements of FCC Rules and Regulations as listed in 47 CFR Ch.1 Parts 0 to 19 and Parts 20 to 69 (10-1-06 Edition). The following subparts are applicable to the results in this test report.

##### **Part 2**

Subpart J - Equipment Authorization Procedures, Certification

§ 2.1046 Measurement required: RF power output

§ 2.1049 Measurement required: Occupied bandwidth

§ 2.1051 Measurement required: Spurious emissions at antenna terminals

§ 2.1053 Measurement required: Field strength of spurious radiation

§ 2.1055 Measurement required: Frequency stability

§ 2.1057 Frequency spectrum to be investigated

##### **Part 22**

Subpart C – Operational and Technical Requirements

§ 22.355 Frequency tolerance

Subpart H – Cellular Radiotelephone Service

§ 22.913 Effective radiated power limits

§ 22.917 Emission limitations for cellular equipment

#### **Summary Test**

**The EUT complied with all performed tests as listed in chapter 0.2 Measurement Summary.**

## 0.2 Measurement Summary

### RF Power Output

| The measurement was performed according to FCC §2.1046 |           |           | 10-1-06      |
|--------------------------------------------------------|-----------|-----------|--------------|
| OP-Mode                                                | Setup     | Port      | Final Result |
| op-mode 1                                              | Setup_a01 | enclosure | passed       |
| op-mode 2                                              | Setup_a01 | enclosure | passed       |
| op-mode 3                                              | Setup_a01 | enclosure | passed       |
| op-mode 4                                              | Setup_a01 | enclosure | passed       |
| op-mode 5                                              | Setup_a01 | enclosure | passed       |
| op-mode 6                                              | Setup_a01 | enclosure | passed       |
| op-mode 7                                              | Setup_a01 | enclosure | passed       |
| op-mode 8                                              | Setup_a01 | enclosure | passed       |
| op-mode 9                                              | Setup_a01 | enclosure | passed       |
| op-mode 10                                             | Setup_a01 | enclosure | passed       |
| op-mode 11                                             | Setup_a01 | enclosure | passed       |
| op-mode 12                                             | Setup_a01 | enclosure | passed       |

### Frequency stability

| The measurement was performed according to FCC §2.1055 |       |      | 10-1-06      |
|--------------------------------------------------------|-------|------|--------------|
| OP-Mode                                                | Setup | Port | Final Result |
|                                                        |       |      | N/P          |

### Spurious emissions at antenna terminals

| The measurement was performed according to FCC §2.1051 |       |      | 10-1-06      |
|--------------------------------------------------------|-------|------|--------------|
| OP-Mode                                                | Setup | Port | Final Result |
|                                                        |       |      | N/P          |

### Field strength of spurious radiation

| The measurement was performed according to FCC §2.1053 |       |      | 10-1-06      |
|--------------------------------------------------------|-------|------|--------------|
| OP-Mode                                                | Setup | Port | Final Result |
|                                                        |       |      | N/P          |

### Emission and Occupied Bandwidth

| The measurement was performed according to FCC §2.1049 |       |      | 10-1-06      |
|--------------------------------------------------------|-------|------|--------------|
| OP-Mode                                                | Setup | Port | Final Result |
|                                                        |       |      | N/P          |

### Band edge compliance

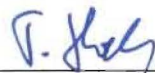
| The measurement was performed according to FCC §2.1053 |       |      | 10-1-06      |
|--------------------------------------------------------|-------|------|--------------|
| OP-Mode                                                | Setup | Port | Final Result |
|                                                        |       |      | N/P          |

N/P: not performed

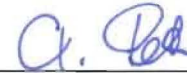
The tests were selected by the customer. As a signalling unit a CMU200 by R&S was provided by the customer and used for carrying out the tests. The settings of the CMU200 were provided by the customer, too. The HSUPA software on the CMU200 is a beta version by R&S, version 4x50.

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Responsible for  
Accreditation Scope:



Responsible  
for Test Report:





## **1 Administrative Data**

### **1.1 Testing Laboratory**

Company Name: 7 Layers AG  
Address Borsigstr. 11  
40880 Ratingen  
Germany

This facility has been fully described in a report submitted to the FCC and accepted under the registration number 96716 .

The test facility is also accredited by the following accreditation organisation:  
- Deutscher Akkreditierungs Rat DAR-Registration no. DAT-P-192/99-01

Responsible for Accreditation Scope: Dipl.-Ing. Bernhard Retka  
Dipl.-Ing. Robert Machulec  
Dipl.-Ing. Thomas Hoell

Report Template Version: 2006-12-18

### **1.2 Project Data**

Responsible for testing and report: Dipl.-Ing. Andreas Petz  
Receipt of EUT: See chapter 2.2  
Date of Test(s): 2007-06-27 to 2007-07-02  
Date of Report: 2007-07-02

### **1.3 Applicant Data**

Company Name: Option NV  
Address: Gaston Geenslaan 14  
3001 Leuven  
Belgium  
Contact Person: Mr. Lodeweyckx

### **1.4 Manufacturer Data**

Company Name: please see applicant data  
Address:  
Contact Person:

## 2 Testobject Data

### 2.1 General EUT Description

|                                             |                                                                    |
|---------------------------------------------|--------------------------------------------------------------------|
| <b>Equipment under Test:</b>                | GSM/UMTS PCMCIA Card                                               |
| <b>Type Designation:</b>                    | GlobeTrotter Express HSUPA E, GE0301                               |
| <b>Kind of Device:</b><br><b>(optional)</b> | GSM 850/900/1800/1900 + UTRA FDD I/II/V<br>including HSDPA + HSUPA |
| <b>Voltage Type:</b>                        | DC                                                                 |
| <b>Nominal Voltage:</b>                     | 3.5 V                                                              |
| <b>Maximum Voltage:</b>                     | 3.5 V                                                              |
| <b>Minimum Voltage:</b>                     | 3.15 V                                                             |

#### **General product description:**

The Equipment under Test (EUT) is a data card that supports GSM/EDGE 850/900/1800/1900 and FDD I, II and V with HSDPA and HSUPA. The manufacturer declared that nominal voltage is equal to high voltage.

In GSM 850 mode the EUT operates in channel blocks A and B from 824.2 MHz (lowest channel = 128) to 848.8 MHz (highest channel = 251).

#### **The EUT provides the following ports:**

##### **Ports**

antenna connector  
enclosure

**The main components of the EUT are listed and described in Chapter 2.2**



## 2.2 EUT Main components

### Type, S/N, Short Descriptions etc. used in this Test Report

| Short Description                                                                                                     | Equipment under Test            | Type Designation | Serial No. | HW Status | SW Status | Date of Receipt |
|-----------------------------------------------------------------------------------------------------------------------|---------------------------------|------------------|------------|-----------|-----------|-----------------|
| EUT A<br>(Code: 37230J14)                                                                                             | GlobeTrotter Express<br>HSUPA E | GE0301           | EE4473100N | 4.0       | 2.6.1     | 2007-05-02      |
| Remark: EUT is equipped with an integral antenna (gain= -2.11 dBD = 0.03 dBi -2.14) and a permanent antenna connector |                                 |                  |            |           |           |                 |

**NOTE: The short description is used to simplify the identification of the EUT in this test report.**

## 2.3 Ancillary Equipment

For the purposes of this test report, ancillary equipment is defined as equipment which is used in conjunction with the EUT to provide operational and control features to the EUT. It is necessary to configure the system in a typical fashion, as a customer would normally use it. But nevertheless Ancillary Equipment can influence the test results.

| Short Description | Equipment under Test | Type Designation | HW Status | SW Status | Serial no. | FCC ID |
|-------------------|----------------------|------------------|-----------|-----------|------------|--------|
| AE1               | Test Cradle          | BONZAI V1.0      | -         | -         | -          | -      |

## 2.4 EUT Setups

This chapter describes the combination of EUT's and ancillary equipment used for testing.

| Setup No. | Combination of EUTs | Description                |
|-----------|---------------------|----------------------------|
| setup_a01 | EUT A + AE1         | PC card in the test cradle |

## 2.5 Operating Modes

This chapter describes the operating modes of the EUT's used for testing.

| Op. Mode                       | Description of Operating Modes                                              | Remarks                                              |
|--------------------------------|-----------------------------------------------------------------------------|------------------------------------------------------|
| <b>PCS data call</b>           |                                                                             |                                                      |
| op-mode 1                      | Call established on Traffic Channel (TCH) 128, Carrier Frequency 824.2 MHz  | 128 is the lowest channel<br>PCS data call           |
| op-mode 2                      | Call established on Traffic Channel (TCH) 190, Carrier Frequency 836.6 MHz  | 190 is a mid channel<br>PCS data call                |
| op-mode 3                      | Call established on Traffic Channel (TCH) 251, Carrier Frequency 848.8 MHz  | 251 is the highest channel<br>PCS data call          |
| <b>EDGE data call</b>          |                                                                             |                                                      |
| op-mode 4                      | Call established on Traffic Channel (TCH) 128, Carrier Frequency 824.2 MHz  | 128 is the lowest channel<br>EDGE data call          |
| op-mode 5                      | Call established on Traffic Channel (TCH) 190, Carrier Frequency 836.6 MHz  | 190 is a mid channel<br>EDGE data call               |
| op-mode 6                      | Call established on Traffic Channel (TCH) 251, Carrier Frequency 848.8 MHz  | 251 is the highest channel<br>EDGE data call         |
| <b>FDD V data call CS mode</b> |                                                                             |                                                      |
| op-mode 7                      | Call established on Traffic Channel (TCH) 4132, Carrier Frequency 826.4 MHz | 4132 is the lowest channel<br>FDD V data call        |
| op-mode 8                      | Call established on Traffic Channel (TCH) 4183, Carrier Frequency 836.6 MHz | 4183 is a mid channel<br>FDD V data call             |
| op-mode 9                      | Call established on Traffic Channel (TCH) 4233, Carrier Frequency 846.6 MHz | 4233 is the highest channel<br>FDD V data call       |
| <b>FDD V data call HSUPA</b>   |                                                                             |                                                      |
| op-mode 10                     | Call established on Traffic Channel (TCH) 4132, Carrier Frequency 826.4 MHz | 4132 is the lowest channel<br>FDD V data call HSUPA  |
| op-mode 11                     | Call established on Traffic Channel (TCH) 4183, Carrier Frequency 836.6 MHz | 4183 is a mid channel<br>FDD V data call HSUPA       |
| op-mode 12                     | Call established on Traffic Channel (TCH) 4233, Carrier Frequency 846.6 MHz | 4233 is the highest channel<br>FDD V data call HSUPA |

The following parameter sets were provided by the customer:

| Parameter set                         | Mode       | Loopback Mode | Rel99 RMC    | HSDPA FRC | HSUPA Test     | Number of E-DPDCH Channels |
|---------------------------------------|------------|---------------|--------------|-----------|----------------|----------------------------|
| For FDD V data call <b>CS mode</b>    | Rel99      | Test Mode 1   | 12.2kbps RMC | -         | -              | -                          |
| For FDD V data call <b>HSUPA mode</b> | Rel6 HSUPA | Test Mode 1   | 12.2kbps RMC | H-Set1    | HSUPA Loopback | 1                          |

| Parameter set                         | Max UL Data Rate (kb/s) | $\beta_c/\beta_d$ | $\beta_{hs}$ | $\beta_{ed}$ | CM | Power Class 3 limit |
|---------------------------------------|-------------------------|-------------------|--------------|--------------|----|---------------------|
| For FDD V data call <b>CS mode</b>    | -                       | 8/15              | -            | -            | -  | 24 (+1.7/-3.7 dB)   |
| For FDD V data call <b>HSUPA mode</b> | 242.1                   | 11/15             | 22/15        | 1309/225     | 1  | 24 (+1.7/-3.7 dB)   |



### 3 Test Results

#### 3.1 RF Power Output

**Standard** FCC Part 22, 10-1-06  
Subpart H

The test was performed according to: FCC §2.1046, 10-1-06

##### 3.1.1 Test Description

- 1) The mobile station was placed inside the fully anechoic chamber on a positioning system. The mobile station was coupled via air link to a Digital Communication Tester (R&S CMU200 Digital Communication Tester/base station simulator) which was located outside the chamber for signalling. The measurement distance between the measurement antenna and the mobile station was 3m.
- 2) A call was established on a Traffic Channel (TCH) between the mobile station and the base station simulator.
- 3) A pre-calibration procedure is used so that the readings from the spectrum analyser are corrected and represent directly the equivalent radiated power (related to a half wave dipole) ERP.
- 4) All measurements were performed with a spectrum analyser and the appropriate calibrated antennas
- 5) Important Analyser Settings:
  - Detector: Peak - Maxhold
  - Frequency span: 15 MHz
  - RBW: 5 MHz
  - VBW: 5 MHz
  - Measuring time: coupled
- 6) The measurement was performed in steps:
  - The mobile station was rotated in order to find the position of maximum radiated output power. This was performed for both polarisations of the measurement antenna (Vertical + Horizontal)
  - At the position of maximum radiated output power the ERP is measured. The measurement time was chosen long enough to allow the trace to stabilize.
  - The measured value (ERP) is recorded in the test report
  - The steps described above were repeated for the different operating modes.

##### 3.1.2 Test Requirements / Limits

§2.1046 Measurements Required: RF Power Output

(a) For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in § 2.1033(c)(8). The electrical



characteristics of the output terminals when this test is made shall be stated.

#### §22.913 Effective radiated power limits

(a) Maximum ERP. ... The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.



### 3.1.3 Test Protocol

Temperature: 27 °C  
Air Pressure: 1012 hPa  
Humidity: 27 %

| Op. Mode        | Setup     | Port      |
|-----------------|-----------|-----------|
| see table below | setup_a01 | enclosure |

| operating mode | max. output power ERP/dBm |
|----------------|---------------------------|
| 1              | 24.45                     |
| 2              | 24.86                     |
| 3              | 23.32                     |
| 4              | 22.16                     |
| 5              | 21.6                      |
| 6              | 20.85                     |
| 7              | 17.33                     |
| 8              | 18.15                     |
| 9              | 17.84                     |
| 10             | 20.03                     |
| 11             | 21.32                     |
| 12             | 21.92                     |

Remark: none

### 3.1.4 Test result: RF Power Output

FCC Part 22, Subpart H

| Op. Mode   | Result |
|------------|--------|
| op-mode 1  | passed |
| op-mode 2  | passed |
| op-mode 3  | passed |
| op-mode 4  | passed |
| op-mode 5  | passed |
| op-mode 6  | passed |
| op-mode 7  | passed |
| op-mode 8  | passed |
| op-mode 9  | passed |
| op-mode 10 | passed |
| op-mode 11 | passed |
| op-mode 12 | passed |

## 4 Test Equipment

### *EUT Digital Signalling System*

| <b>Equipment</b>                                 | <b>Type</b> | <b>Serial No.</b> | <b>Manufacturer</b> |
|--------------------------------------------------|-------------|-------------------|---------------------|
| Digital Radio Communication Tester               | CMD 55      | 831050/020        | Rohde & Schwarz     |
| Signalling Unit for Bluetooth Spurious Emissions | PTW60       | 100004            | Rohde & Schwarz     |
| Universal Radio Communication Tester             | CMU 200     | 103785            | Rohde & Schwarz     |
| Universal Radio Communication Tester             | CMU 200     | 102366            | Rohde & Schwarz     |

### *EMI Test System*

| <b>Equipment</b>         | <b>Type</b> | <b>Serial No.</b> | <b>Manufacturer</b> |
|--------------------------|-------------|-------------------|---------------------|
| Comparison Noise Emitter | CNE III     | 99/016            | York                |
| EMI Analyzer             | ESI 26      | 830482/004        | Rohde & Schwarz     |
| Signal Generator         | SMR 20      | 846834/008        | Rohde & Schwarz     |

### *EMI Radiated Auxiliary Equipment*

| <b>Equipment</b>                | <b>Type</b>          | <b>Serial No.</b>   | <b>Manufacturer</b>   |
|---------------------------------|----------------------|---------------------|-----------------------|
| Antenna mast 4m                 | MA 240               | 240/492             | HD GmbH H. Deisel     |
| Biconical dipole                | VUBA 9117            | 9117108             | Schwarzbeck           |
| Broadband Amplifier 18MHz-26GHz | JS4-18002600-32      | 849785              | Miteq                 |
| Broadband Amplifier 30MHz-18GHz | JS4-00101800-35      | 896037              | Miteq                 |
| Broadband Amplifier 45MHz-27GHz | JS4-00102600-42      | 619368              | Miteq                 |
| Cable "ESI to EMI Antenna"      | EcoFlex10            | W18.01-2 + W38.01-2 | Kabel Kusch           |
| Cable "ESI to Horn Antenna"     | UFB311A + UFB293C    | W18.02-2 + W38.02-2 | Rosenberger-Microcoax |
| Double-ridged horn              | HF 906               | 357357/002          | Rohde & Schwarz       |
| Double-ridged horn              | HF 906               | 357357/001          | Rohde & Schwarz       |
| High Pass Filter                | 5HC3500/12750-1.2-KK | 200035008           | Trilithic             |
| High Pass Filter                | 5HC2700/12750-1.5-KK | 9942012             | Trilithic             |
| High Pass Filter                | 4HC1600/12750-1.5-KK | 9942011             | Trilithic             |
| KUEP pre amplifier              | Kuep 00304000        | 001                 | 7layers               |
| Log.-per. Antenna               | HL 562 Ultralog      | 830547/003          | Rohde & Schwarz       |
| Loop Antenna                    | HFH2-Z2              | 829324/006          | Rohde & Schwarz       |
| Pyramidal Horn Antenna 26.5 GHz | Model 3160-09        | 9910-1184           | EMCO                  |

### EMI Conducted Auxiliary Equipment

| Equipment           | Type     | Serial No.    | Manufacturer    |
|---------------------|----------|---------------|-----------------|
| Cable "LISN to ESI" | RG214    | W18.03+W48.03 | Huber+Suhner    |
| Two-Line V-Network  | ESH 3-Z5 | 828304/029    | Rohde & Schwarz |
| Two-Line V-Network  | ESH 3-Z5 | 829996/002    | Rohde & Schwarz |

### Auxiliary Test Equipment

| Equipment                              | Type                 | Serial No.     | Manufacturer                         |
|----------------------------------------|----------------------|----------------|--------------------------------------|
| Broadband Resist.<br>Power Divider N   | 1506A / 93459        | LM390          | Weinschel                            |
| Broadband Resist.<br>Power Divider SMA | 1515 / 93459         | LN673          | Weinschel                            |
| Digital Multimeter 01                  | Voltcraft M-3860M    | IJ096055       | Conrad                               |
| Digital Multimeter 02                  | Voltcraft M-3860M    | IJ095955       | Conrad                               |
| Digital Oscilloscope                   | TDS 784C             | B021311        | Tektronix                            |
| Fibre optic link Satellite             | FO RS232 Link        | 181-018        | Pontis                               |
| Fibre optic link<br>Transceiver        | FO RS232 Link        | 182-018        | Pontis                               |
| I/Q Modulation<br>Generator            | AMIQ-B1              | 832085/018     | Rohde & Schwarz                      |
| Notch Filter ultra stable              | WRCA800/960-6E       | 24             | Wainwright                           |
| Spectrum Analyzer 9<br>kHz to 3 GHz    | FSP3                 | 838164/004     | Rohde & Schwarz                      |
| Temperature Chamber                    | VT 4002              | 58566002150010 | Vötsch                               |
| Temperature Chamber                    | KWP 120/70           | 59226012190010 | Weiss                                |
| ThermoHygro<br>Datalogger 03           | Opus10 THI (8152.00) | 7482           | Lufft Mess- und<br>Regeltechnik GmbH |

### Anechoic Chamber

| Equipment                            | Type           | Serial No.                | Manufacturer                           |
|--------------------------------------|----------------|---------------------------|----------------------------------------|
| Air Compressor<br>(pneumatic)        |                |                           | Atlas Copco                            |
| Controller                           | CO 2000        | CO2000/328/12470406<br>/L | Innco innovative<br>constructions GmbH |
| EMC Camera                           | CE-CAM/1       |                           | CE-SYS                                 |
| EMC Camera for<br>observation of EUT | CCD-400E       | 0005033                   | Mitsubishi                             |
| Filter ISDN                          | B84312-C110-E1 |                           | Siemens&Matsushita                     |
| Filter telephone systems<br>/ modem  | B84312-C40-B1  |                           | Siemens&Matsushita                     |
| Filter Universal 1A                  | B84312-C30-H3  |                           | Siemens&Matsushita                     |
| Fully/Semi AE Chamber                | 10.58x6.38x6   |                           | Frankonia                              |
| Turntable                            | DS 420S        | 420/573/99                | HD GmbH, H. Deisel                     |
| Valve Control Unit<br>(pneum.)       | VE 615P        | 615/348/99                | HD GmbH, H. Deisel                     |



*7 layers Bluetooth™ Full RF Test  
Solution*

*Bluetooth RF Conformance  
Test System TS8960*

| <b>Equipment</b>                          | <b>Type</b>      | <b>Serial No.</b> | <b>Manufacturer</b> |
|-------------------------------------------|------------------|-------------------|---------------------|
| 10 MHz Reference                          | MFS              | 5489/001          | Efratom             |
| Power Meter<br>832025/059                 | NRVD             | 832025/059        | Rohde & Schwarz     |
| Power Sensor A<br>832279/013              | NRV-Z1           | 832279/013        | Rohde & Schwarz     |
| Power Sensor B<br>832279/015              | NRV-Z1           | 832279/015        | Rohde & Schwarz     |
| Power Supply                              | E3632A           | MY40003776        | Agilent             |
| Power Supply                              | PS-2403D         | -                 | Conrad              |
| RF Step Attenuator<br>833695/001          | RSP              | 833695/001        | Rohde & Schwarz     |
| Rubidium Frequency<br>Normal              | MFS              | 002               | Efratom             |
| Signal Analyzer FSIQ26<br>832695/007      | FSIQ26           | 832695/007        | Rohde & Schwarz     |
| Signal Generator<br>833680/003            | SMP 03           | 833680/003        | Rohde & Schwarz     |
| Signal Generator A<br>834344/002          | SMIQ03B          | 834344/002        | Rohde & Schwarz     |
| Signal Generator B<br>832870/017          | SMIQ03B          | 832870/017        | Rohde & Schwarz     |
| Signal Switching and<br>Conditioning Unit | SSCU             | 338826/005        | Rohde & Schwarz     |
| Signalling Unit PTW60<br>838312/014       | PTW60 for TS8960 | 838312/014        | Rohde & Schwarz     |
| System Controller<br>829323/008           | PSM12            | 829323/008        | Rohde & Schwarz     |

## 5 Photo Report



**Photo 1:** EUT (top side)

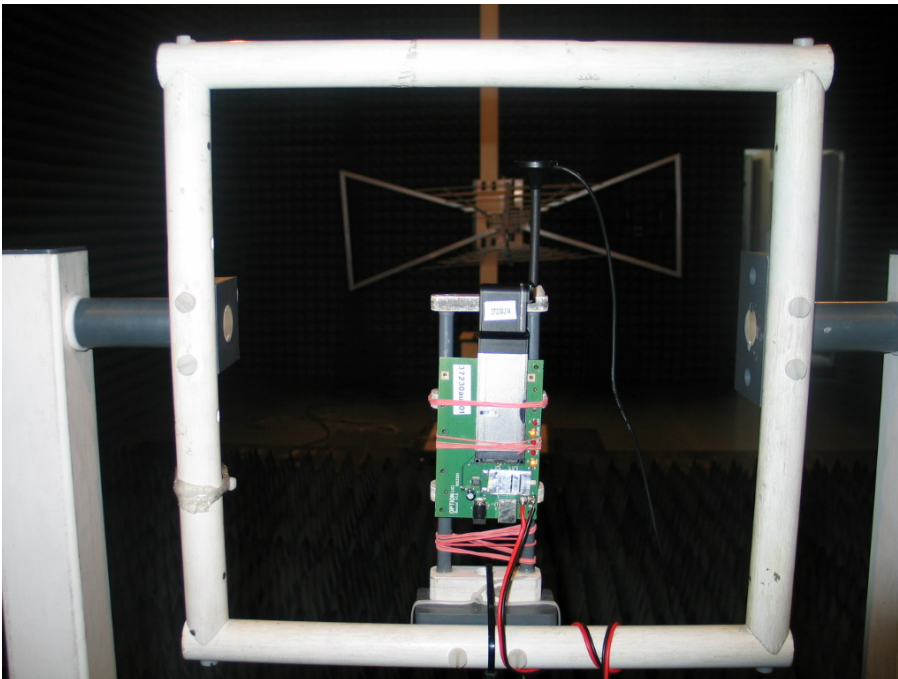


**Photo 2:** EUT (bottom side)





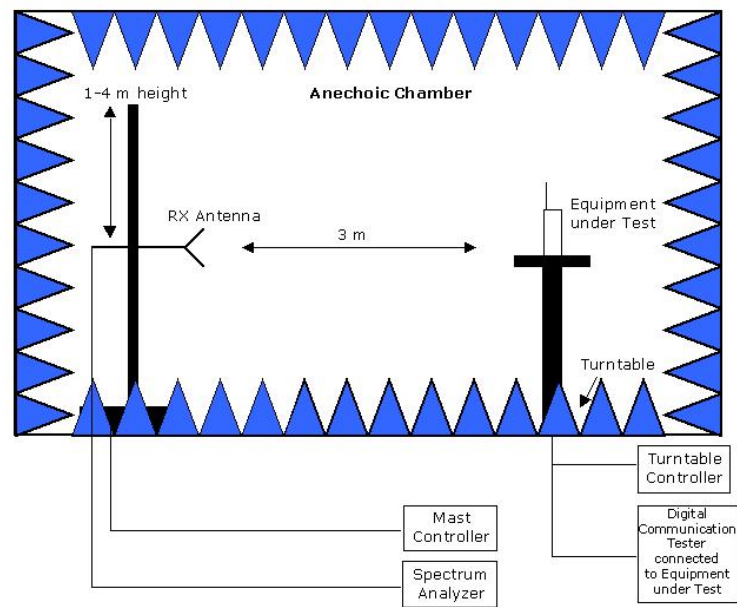
**Photo 3:** EUT (view to antenna connector)



**Photo 4:** Test setup in the anechoic chamber



## 6 Setup Drawings



Remark: Depending on the frequency range suitable antenna types, attenuators or preamplifiers are used.

**Drawing 1:** Principle setup for radiated measurements.